ESA section 7 Consultation Number F/NWR/2002/01039

National Marine Fisheries Service
Endangered Species Act (ESA) Section 7 Consultation
Biological Opinion and Magnuson–Stevens Act Essential Fish Habitat Consultation

Action Agency: The Bonneville Power Administration (BPA)

Species/
ESU Affected: Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*)

Action Considered: BPA funding of a research action regarding Pacific lamprey (*Lampetra tridentata*) proposed by the Confederated Tribes of the Umatilla Indian Reservation of Oregon (CTUIR).

Consultation
Conducted by: The Protected Resources Division (PRD), Northwest Region, National Marine Fisheries Service (NOAA Fisheries), Consultation Number F/NWR/2002/01039

This Biological Opinion (Opinion) constitutes NOAA Fisheries' review of a research action that could affect MCR steelhead. It has been prepared in accordance with section 7 of the ESA of 1973, as amended (16 U.S.C. 1531 et seq.). It is based on information provided in the biological assessment, published and unpublished scientific information on the biology and ecology of threatened steelhead in the action area, and other sources of information. A complete administrative record of this consultation is on file with the PRD in Portland, Oregon.

Approved by: D. Robert Lohn, Regional Administrator
Date: 11/15/02 (**Expires on:** December 31, 2006)

CONSULTATION HISTORY

NOAA Fisheries proposes to consult on a research action funded by the BPA and implemented by the CTUIR and thereby authorize scientific research that may affect threatened MCR steelhead. The proposed research may affect ESA-listed species under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) thus the BPA has initiated consultation with the USFWS as well.

On April 29, 2002, the BPA sent PRD a request for consultation on behalf of the CTUIR (though discussions about the project actually began in late 2001). The PRD subsequently requested—and received—a number of clarifications regarding the consultation request. The complete history for the proposed research action may be found in the administrative record the PRD maintains for this consultation in Portland, Oregon.

On August 1, 2002, NOAA Fisheries completed a formal consultation (consultation number F/NWR/2001/01426) on studies affecting MCR steelhead. This Opinion incorporates the earlier consultation and builds on the status of and effects to the species.

DESCRIPTION OF THE PROPOSED ACTION

Common elements in this Opinion and other permits/authorizations in the middle Columbia River

The BPA proposes to fund the research action considered in this Opinion until December 31, 2006. Research permits and incidental take statements (ITS) associated with ESA section 7 consultations lay out the general and special conditions to be followed before, during, and after the research activities are conducted. These conditions are intended to (a) manage the interaction between scientists and ESA-listed salmonids by requiring that research activities be coordinated among permit holders/researchers and between permit holders/researchers and NOAA Fisheries, (b) require measures to minimize impacts on listed species, and (c) report to NOAA Fisheries information on the effects the authorized activities have on the species concerned. The following conditions are common to all of the permits and ITSs affecting MCR steelhead and will be applicable in this case. In all cases, the authorized party must:

1. Anesthetize each ESA-listed fish that is handled out-of-water. Anesthetized fish must be allowed to recover (e.g., in a recovery tank) before being released. Fish that are simply counted must remain in water and do not need to be anesthetized.

2. Handle each ESA-listed fish with extreme care and keep them in water to the maximum extent possible during sampling and processing procedures. The holding units must contain adequate amounts of well-circulated water. When using gear that captures a mix of species, ESA-listed fish must be processed first to minimize the duration of handling stress. The transfer of ESA-listed fish must be conducted using a sanctuary net when necessary to prevent the added stress of an out-of-water transfer.

3. Stop handling ESA-listed juvenile fish if the water temperature exceeds 70 degrees Fahrenheit at the capture site. Under these conditions, ESA-listed fish may only be identified and counted.

4. Use a sterilized needle for each individual injection when using a passive integrated

transponder tag (PIT-tag) to mark ESA-listed fish. This is done to minimize the transfer of pathogens between fish.

5. Notify NOAA Fisheries in advance of any changes in sampling locations or research protocols and obtain approval before implementing those changes.

6. Not intentionally kill (or cause to be killed) any ESA-listed species authorized to be taken, unless lethal take is allowed.

7. Exercise due caution during spawning ground surveys to avoid disturbing, disrupting, or harassing ESA-listed adult salmonids when they are spawning. Whenever possible, walking in the stream must be avoided—especially in areas where ESA-listed salmonids are likely to spawn.

8. Use visual observation protocols instead of intrusive sampling methods whenever possible. This is especially appropriate when merely ascertaining whether anadromous fish are present. Snorkeling and streamside surveys should replace electrofishing procedures whenever possible.

9. Comply with NOAA Fisheries' backpack electrofishing guidelines when using backpack electroshocking equipment to collect ESA-listed fish.

10. Report to NOAA Fisheries whenever the authorized level of take is exceeded or if circumstances indicate that such an event is imminent. Notification should be made as soon as possible, but no later than two days after the authorized level of take is exceeded. Researchers must then submit a detailed written report. Pending review of these circumstances, NOAA Fisheries may suspend research activities or reinitiate consultation before allowing research activities to continue.

11. Submit to NOAA Fisheries a post-season report summarizing the results of the research. The report must include a detailed description of activities, the total number of fish taken at each location, an estimate of the number of ESA-listed fish taken at each location, the manner of take, the dates/locations of take, and a discussion of the degree to which the research goals were met.

Any additional specific conditions are included in the descriptions of the respective permits/ authorizations.

The activities identified in the proposed research action will be funded by the BPA. This consultation examines the activities they propose to fund and thus will fulfill their section 7 consultation requirement.

Finally, NOAA Fisheries will monitor the actual number of listed fish taken annually in the scientific research activities (as provided to NOAA Fisheries in annual reports or by other means) and shall adjust authorized take levels if they are deemed to be excessive or if cumulative take levels rise to the level where they are detrimental to the listed species.

The Research Action

The following describes the overall amount of take being requested in the research action and the general types of action with which that take would be associated. "Take" is defined in section 3 of the ESA; it means to harass, harm, pursue, hunt, shoot, wound, kill, trap capture or collect [a listed species] or to attempt to engage in any such conduct. A detailed, action-by-action breakdown (i.e., how much take would be associated with each proposed activity) is found in the "Determination of Effects" section.

Under this action, the CTUIR proposes to determine existing Pacific lamprey production levels and assess the possible effects of introducing adult lamprey from the John Day River system into the Umatilla River as broodstock. Five research objectives are proposed: (1) Estimate lamprey abundance before and after outplanting adults in the Umatilla River, (2) increase larval lamprey abundance in the Umatilla River, (3) determine reproductive success of adult lamprey outplants, (4) assess the effects and effectiveness of artificially propagating Pacific lamprey, and (5) measure the response of juvenile Pacific lamprey to bile salts using electro-olfactogram (EOG) techniques.

The researchers intend to use a variety of techniques to capture adult and juvenile lamprey. The techniques that may affect MCR steelhead are fyke netting in the lower Umatilla and John Day Rivers, hoop netting in the John Day River, sediment electrofishing for lamprey larvae, water sampling, and lamprey redd surveys. Adult and juvenile lamprey will also be captured at fish traps on the lower Umatilla River and at Bonneville and John Day Dams but those activities are authorized under separate consultations (NOAA Fisheries 1998, NOAA Fisheries 2002b).

Even though MCR steelhead are not the target of the research, some of them are likely to be inadvertently captured during the activities involving fyke netting and hoop netting. Any MCR steelhead captured during these netting operations will be counted and immediately released. During the other activities that may affect MCR steelhead— electrofishing, water sampling, and redd surveys—the fish will simply be observed. In addition, holding lamprey at Three Mile Dam and adult lamprey introductions in the Umatilla River may have indirect effects on MCR steelhead but these effects are considered unquantifiable and, in any case, very minor compared to actual fish handling. A discussion of indirect effects and measures to minimize them is found in the "Research-specific Effects" section.

The Action Area

The action area for the proposed research project comprises two main river systems on the Oregon side of the MCR subbasin. The actions have the potential to affect the water, substrate, and adjacent riparian zones of accessible riverine reaches in several hydrologic units and counties. Accessible reaches are those within the historical range of the MCR ESU that can still be occupied by any steelhead life stage. These include all river reaches accessible to listed steelhead in Columbia River tributaries (except the Snake River) between Mosier Creek in Oregon and the Yakima River in Washington (inclusive). Major river subbasins containing spawning and rearing habitat for this ESU comprise approximately 26,739 square miles in Oregon and Washington. The following counties lie partially or wholly within these subbasins (or contain migration habitat for the species): Oregon—Clatsop, Columbia, Crook, Gilliam, Grant, Harney, Hood River, Jefferson, Morrow, Multnomah, Sherman, Umatilla, Union, Wallowa, Wasco, and Wheeler; Washington—Benton, Clark, Columbia, Cowlitz, Franklin, Kittitas, Klickitat, Pacific, Skamania, Wahkiakum, Walla Walla, and Yakima. More detailed habitat information (i.e., specific watersheds, migration barriers, habitat features, and special management considerations) for MCR steelhead can be found in the February 16, 2000, *Federal Register* notice designating critical habitat (65 FR 7764)(NOAA 2000). It should be noted, however, that the critical habitat designation for MCR steelhead was vacated and remanded to NOAA Fisheries for new rulemaking pursuant to a court order in May of 2002. In the absence of a new rule designating critical habitat for MCR steelhead, this consultation will evaluate the effects of the proposed actions on the species' habitat to determine whether those actions are likely to jeopardize the species' continued existence.

STATUS OF THE SPECIES UNDER THE ENVIRONMENTAL BASELINE

In order to describe a species' status, it is first necessary to define precisely what "species" means in this context. Traditionally, one thinks of the ESA listing process as pertaining to entire taxonomic species of animals or plants. While this is generally true, the ESA also recognizes that there are times when the listing unit must necessarily be a subset of the species as a whole. In these instances, the ESA allows a "distinct population segment" (DPS) of a species to be listed as threatened or endangered. MCR steelhead are just such a DPS and, as such, are for all intents and purposes considered a "species" under the ESA.

NOAA Fisheries developed the approach for defining salmonid DPSs in 1991 (Waples 1991). It states that a population or group of populations is considered distinct if they are ". . . substantially reproductively isolated from conspecific populations," and if they are considered ". . . an important component of the evolutionary legacy of the species." A distinct population or group populations is referred to as an evolutionarily significant unit (ESU) of the species. Hence, MCR steelhead constitute an ESU of the species *O. mykiss*.

The MCR steelhead ESU was listed as threatened on March 25, 1999 (64 FR 14517). It includes all natural-origin populations in the Columbia River basin above the Wind River, Washington, and the Hood River, Oregon, up to and including the Yakima River, Washington. This ESU includes the only populations of inland winter steelhead in the United States (in the Klickitat River, Washington, and Fifteenmile Creek, Oregon). Both the Deschutes River and Umatilla River hatchery stocks are included in the ESU, but are not listed.

The MCR steelhead were listed because NOAA Fisheries determined that a number of factors—both environmental and demographic—had caused them to decline to the point where they were likely to be in danger of going extinct within the foreseeable future. These factors for decline affect MCR steelhead biological requirements at every life stage and they arise from a number of different sources. This section of the Opinion explores those effects and defines the context within which they take place.

Species/ESU Life History

Steelhead

Steelhead can be divided into two basic run types based on their level of sexual maturity at the time they enter fresh water and the duration of the spawning migration (Burgner et al. 1992). The stream-maturing type, or summer steelhead, enters fresh water in a sexually immature condition and requires several months in fresh water to mature and spawn. The ocean-maturing type, or winter steelhead, enters fresh water with well-developed gonads and spawns relatively shortly after river entry (Barnhart 1986). Variations in migration timing exist between populations. Some river basins have both summer and winter steelhead, others only have one run type.

In the Pacific Northwest, summer steelhead enter fresh water between May and October (Busby et al. 1996, Nickelson et al. 1992). During summer and fall, before spawning, they hold in cool, deep pools (Nickelson et al. 1992). They migrate inland toward spawning areas, overwinter in the larger rivers, resume migration to natal streams in early spring, and then spawn (Meehan and Bjornn 1991, Nickelson et al. 1992). Winter steelhead enter fresh water between November and April in the Pacific Northwest (Busby et al. 1996, Nickelson et al. 1992), migrate to spawning areas, and then spawn in late winter or spring. For more information on steelhead biology please see NOAA Fisheries (2002a), NOAA Fisheries (2000a), and Busby et al. (1996).

MCR Steelhead

Fish in this ESU are predominantly summer steelhead, but winter-run fish are found in the Klickitat River and Fifteenmile Creek. Most fish in this ESU smolt at two years and spend one to two years in salt water before re-entering fresh water, where they may remain up to a year before spawning. Age-2-ocean steelhead dominate the summer steelhead run in the Klickitat River, whereas most other rivers with summer steelhead produce about equal numbers of both age-1- and 2-ocean fish. Juvenile life stages (i.e., eggs, alevins, fry, and parr) inhabit freshwater/riverine areas throughout the range of the ESU. Parr usually undergo a smolt transformation as 2-year-olds, at which time they migrate to the ocean. Subadults and adults forage in coastal and offshore waters of the North Pacific Ocean prior to returning to spawn in their natal streams. A nonanadromous form of *O. mykiss* (redband trout) co-occurs with the anadromous form in this ESU, and juvenile life stages of the two forms can be very difficult to differentiate. In addition, hatchery steelhead are also distributed throughout the range of this ESU. For more information on MCR steelhead life history, please see NOAA Fisheries (2000a) and Busby et al. (1996).

Overview—Status of the MCR Steelhead

To determine a species' status under extant conditions (usually termed "the environmental baseline"), it is necessary to ascertain the degree to which the species' biological requirements are being met at that time and in that action area. For the purposes of this consultation, MCR steelhead biological requirements are expressed in two ways: Population parameters such as fish numbers, distribution, and trends throughout the action area; and the condition of various essential habitat features such as water quality, stream substrates, and food availability. Clearly, these two types of information are interrelated. That is, the condition of a given habitat has a large impact on the number of fish it can support. Nonetheless, it is useful to separate the species' biological requirements into these parameters because doing so provides a more complete picture of all the factors affecting MCR steelhead survival. Therefore, the discussion to follow will be divided into two parts: Species Distribution and Trends; and Factors Affecting the Environmental Baseline.

Species Distribution and Trends

<u>Distribution</u>

Recent adult data for this ESU are summarized in NOAA Fisheries' biological opinion on the operation of the Federal Columbia River Power System (NOAA Fisheries 2000a). Estimates of historical (pre-1960s) abundance specific to this ESU are available for the Yakima River, which had an estimated run size of 100,000 (WDF et al. 1993). Assuming comparable run sizes for other drainage areas in this ESU, the total historical run size may have exceeded 300,000 steelhead.

In 1997, NOAA Fisheries reassessed the status of this ESU (NOAA Fisheries 1997). Updated dam counts from the Deschutes River showed a 5-year geometric mean of approximately 9,700 summer steelhead in recent runs, corresponding to an escapement of 1,400 natural fish. For 1997, steelhead escapement above Sherars Falls included 17,566 stray hatchery steelhead and 1,729 naturally-produced Deschutes River steelhead. Run reconstructions for the Yakima, John Day, and Touchet Rivers estimate that recent natural escapements are 1,000, 10,000, and 300 steelhead, respectively.

The abundance of naturally produced steelhead in the Umatilla basin since 1980 followed a pattern similar to that of other steelhead populations in the Columbia River basin, especially those in the John Day River. Umatilla data show a peak in naturally produced steelhead abundance in the 1980s and a subsequent decline in the 1990s, punctuated by a spike in abundance in 1992. Counts for 2000 and 2001 were much higher than were those in the late 1990s. Also, the percentage of hatchery fish in the natural spawning population has increased since 1988 when hatchery steelhead first began returning to the Umatilla River (NOAA Fisheries 2002c).

Table 1. Umatilla River steelhead escapement to Threemile Dam, Umatilla River 1991-2001.[1]

Brood Year	Hatchery	Naturally produced	Total	Percent Hatchery
1991	387	725	1,112	34.8
1992	523	2,264	2,769	18.9
1993	616	1,297	1,913	32.2
1994	345	945	1,290	26.7
1995	656	875	1,531	42.9
1996	785	1,296	2,081	37.7
1997	1,463	1,014	2,477	59.1
1998	802	773	1,575	50.9
1999	661	1,024	2,547	26.0
2000	713	2,032	2,745	26.0
2001		5,519		

John Day River summer steelhead populations have shown a declining trend in escapements since the early 1980s with spikes in abundance in 1990 and 1992, reaching a low of an estimated 3,908 in 1995. More recent returns have ranged between 5,000 and 7,000 adults with a much higher count in 2000 (NOAA Fisheries 2002c).

[1] 2001 fish counts are preliminary.

Table 2. John Day River steelhead redd counts and expanded estimates from 1991 to 2000.

Year	Redds/mile	Miles of Streams	Fish/redd	Expanded Estimates
1991	2.4	1,800	1.67	7,214
1992	5.6	1,800	1.67	16,834
1993	2.3	1,800	1.67	6,914
1994	3.2	1,800	1.67	9,619
1995	1.3	1,800	1.67	3,908
1996	2.2	1,800	1.67	6,613
1997	1.8	1,800	1.67	5,411
1998	1.8	1,800	1.67	5,411
1999	2.3	1,800	1.67	6,914
2000	5.1	1,800	1.67	15,330

There is very little data on the historical numbers of juvenile outmigrants for the MCR steelhead ESU. In recent years however, the juvenile outmigration has been estimated at more than 379,000 fish (Schiewe 2002). And more than one-quarter of the MCR steelhead outmigrants (a recent five-year average of 99,235) were produced in the Yakima River system (NOAA Fisheries 2002b).

Trends

For the MCR steelhead ESU as a whole, NOAA Fisheries (2000a) estimates that the median population growth rate over the base period (i.e., data from 1980 to the most recent year available) ranges from 0.88 to 0.75, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of natural origin fish.

Escapements to the Yakima and Deschutes River subbasins have shown overall upward trends, although all tributary counts in the Deschutes River are downward, and the Yakima River is recovering from extremely low abundance in the early 1980s. The John Day River probably represents the largest native, naturally-spawning stock in the ESU, and the combined spawner surveys for the John Day River has shown spawner declines of about 15 percent per year since 1985. NOAA Fisheries, in proposing this ESU for listing as threatened under the ESA, cited low returns to the Yakima River, poor abundance estimates for Klickitat River and Fifteenmile Creek winter steelhead, and an overall decline for naturally producing stocks within the ESU. However, estimates based on dam counts show an overall increase in steelhead abundance, with a relatively stable naturally-produced component.

Hatchery fish are widespread and stray to spawn naturally throughout the region. Recent estimates of the proportion of natural spawners of hatchery origin range from low (Yakima, Walla Walla, and John Day Rivers) to moderate (Umatilla and Deschutes Rivers). Most hatchery production in this ESU is derived primarily from within-basin stocks. One recent area of concern is the increase in the number of Snake River hatchery (and possibly wild) steelhead that stray and spawn naturally within the Deschutes River subbasin. In addition, one of the main threats cited in NOAA Fisheries' listing decision for this species was the fact that hatchery fish constituted a steadily increasing proportion of the natural escapement in the MCR steelhead ESU (Fish Passage Center 2000, Brown 1999).

Thus, the degree to which MCR biological requirements are being met with respect to population numbers and distribution is something of a mixed bag. While some improvement can be seen throughout the ESU as a whole, populations in critical subbasins exhibit continuing declining trends. Therefore, while there is some cause for optimism, there has been no genuine change in the species' status since it was listed, and the most likely scenario is that its biological requirements are not being met with respect to abundance, distribution, and overall trend.

Factors Affecting the Environmental Baseline

Environmental baselines for biological opinions are defined by regulation at 50 CFR 402.02, which states that an environmental baseline is the physical result of all past and present state, Federal, and private activities in the action area along with the anticipated impacts of all proposed Federal projects in the action area (that have already undergone formal or early section 7 consultation). The environmental baseline for *this* biological opinion is therefore the result of the impacts a great many activities (summarized below) have had on MCR steelhead survival and recovery. Put another way (and as touched upon previously), the baseline is the culmination of the effects that multiple activities have had on the species' *biological requirements* and, by examining those individual effects, it is possible to derive the species' status in the action area.

Many of the biological requirements for MCR steelhead in the action area can best be expressed in terms of essential habitat features. That is, the steelhead require adequate: (1) substrate (especially spawning gravel), (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) migration conditions (February 16, 2000, 65 FR 7764). The best scientific information presently available demonstrates that a multitude of factors, past and present, have contributed to the decline of west coast salmonids by adversely affecting these essential habitat features. NOAA Fisheries reviewed much of that information in its recently reinitiated Consultation on Operation of the Federal Columbia River Power System (FCRPS)(NOAA Fisheries 2000a). That review is summarized in the sections below.

It is important to note that while the discussion below concentrates largely on species other than the MCR steelhead, it is simply a case of there being more data on how the various factors for decline have affected those species than exist for the factors' effects on MCR steelhead. The reason for this is that MCR steelhead were listed fairly recently in comparison to, say, Snake River spring/summer chinook (*O. tshawytscha*—listed in 1992). As a result, more studies have been done on how the various factors for decline affect species that were listed further in the past. Nonetheless, even though there is not as much data on the MCR steelhead per se, it can be conclusively stated that the factors affecting every other salmonid species in the Columbia River basin affect MCR steelhead as well. Therefore, in every instance cited below—whether hydropower development or habitat destruction or any other factor—it can be said the MCR steelhead have suffered negative effects similar to those described for the species studied. It should be further noted that the discussion below is simply a solid overview—rather than an exhaustive treatment—of the factors affecting MCR steelhead. For greater detail, please see Busby et al. (1996) and NOAA Fisheries (1991).

The Mainstem Hydropower System

Hydropower development on the Columbia River has dramatically affected anadromous salmonids in the basin. Storage dams have eliminated spawning and rearing habitat and altered the natural hydrograph of the Snake and Columbia Rivers—decreasing spring and summer flows and increasing fall and winter flows. Power operations cause flow levels and river elevations to fluctuate—slowing fish movement through reservoirs, altering riparian ecology, and stranding fish in shallow areas. The 13 dams in the Snake and Columbia River migration corridors kill smolts and adults and alter their migrations. The dams have also converted the once-swift river into a series of slow-moving reservoirs—slowing the smolts' journey to the ocean and creating habitat for predators. Because the MCR steelhead must navigate up to four major hydroelectric projects during their up- and downstream migrations (and experience the effects of other dam operations occurring upstream from their ESU boundary), they feel the influence of all the impacts listed above. For more information on the effects of the mainstem hydropower system, please see NOAA Fisheries (2000a) and NOAA Fisheries (2002a).

Human-Induced Habitat Degradation

The quality and quantity of freshwater habitat in much of the Columbia River basin have declined dramatically in the last 150 years. Forestry, farming, grazing, road construction, hydropower system development, mining, and development have radically changed the historical habitat conditions of the basin. More than 2,500 streams, river segments, and lakes in the Northwest do not meet Federally-approved, state and tribal water quality standards and are now listed as water-quality-limited under Section 303(d) of the Clean Water Act. Tributary water quality problems contribute to poor water quality when sediment and contaminants from the tributaries settle in mainstem reaches and the estuary. Most of the water bodies in Oregon, Washington, and Idaho on the 303(d) list do not meet water quality standards for temperature. High water temperatures adversely affect salmonid metabolism, growth rate, and disease resistance, as well as the timing of adult migrations, fry emergence, and smoltification. Many factors can cause high stream temperatures, but they are primarily related to land-use practices rather than point-source discharges. Some common actions that cause high stream temperatures are the removal of trees or shrubs that directly shade streams, water withdrawals for irrigation or other purposes, and warm irrigation return flows. Loss of wetlands and increases in groundwater withdrawals contribute to lower base-stream flows which, in turn, contribute to temperature increases. Activities that create shallower streams (e.g., channel widening) also cause temperature increases. For more information on the effects associated with habitat degradation—e.g., problems associated with pollution, sedimentation, increased water temperatures, passage barriers, and loss of habitat complexity and refugia—as well as some of the measures being taken to mitigate those effects, please see NOAA Fisheries (2002a).

Hatcheries

For more than 100 years, hatcheries in the Pacific Northwest have been used to (a) produce fish for harvest and (b) replace natural production lost to dam construction and other development—not to protect and rebuild naturally-produced salmonid populations. As a result, most salmonid populations in the region are primarily derived from hatchery fish. In 1987, for example, 95 percent of the coho salmon, 70 percent of the spring chinook salmon, 80 percent of the summer chinook salmon, 50 percent of the fall chinook salmon, and 70 percent of the steelhead returning to the Columbia River basin originated in hatcheries (CBFWA 1990). Because hatcheries have traditionally focused on providing fish for harvest and replacing declines in native runs (and generally not carefully examined their own effects on local populations), it is only recently that the substantial effects of hatcheries on native natural populations been documented. For example, the production of hatchery fish, among other factors, has contributed to the 90 percent reduction in natural coho salmon runs in the lower Columbia River over the past 30 years (Flagg et al. 1995).

Hatchery fish can harm naturally produced salmon and steelhead in four primary ways: (1) ecological effects, (2) genetic effects, (3) overharvest effects, and (4) masking effects (NOAA Fisheries 2000b). Ecologically, hatchery fish can prey upon, displace, and compete with wild fish. These effects are most likely to occur when fish are released in poor condition and do not migrate to marine waters, but rather remain in the streams for extended rearing periods. Hatchery fish also may transmit hatchery-borne diseases, and hatcheries themselves may release disease-carrying effluent into streams. Hatchery fish can affect the genetic composition of native fish by interbreeding with them. Interbreeding can also be caused by humans taking native fish from one area and using them in a hatchery program in another area. Interbred fish are less adapted to the local habitats where the original native stock evolved and may therefore be less productive there. For more information on the adverse effects associated with hatchery operations, please see NOAA Fisheries (2002a).

Harvest

Salmon and steelhead have been harvested in the Columbia basin as long as people have been there. Commercial fishing developed rapidly with the arrival of European settlers and the advent of canning technologies in the late 1800s. The development of non-Indian fisheries began in about 1830; by 1861, commercial fishing was an important economic activity. The early commercial fisheries used gill nets, seines hauled from shore, traps, and fish wheels. Later, purse seines and trolling (using hook and line) fisheries developed. Recreational (sport fishing) harvest began in the late 1800s and took place primarily in tributary locations (ODFW and WDFW 1998). Steelhead have formed a major component of recreational fisheries for decades. Conservation concerns for natural steelhead have caused regulations to be put in place in Oregon and Washington that strictly limit the number of fish anglers may catch and the types of gear that may be used in many areas.

Initially, the non-Indian fisheries targeted spring and summer chinook salmon, and these runs dominated the commercial harvest during the 1800s. Eventually the combined ocean and freshwater harvest rates for Columbia River spring and summer chinook salmon exceeded 80 percent (and sometimes 90 percent) of the run—accelerating the species' decline (Ricker 1959). From 1938 to 1955, the average harvest rate dropped to about 60 percent of the total spring chinook salmon run and appeared to have a minimal effect on subsequent returns (NOAA Fisheries 1991). Until the spring of 2000—when a relatively large run of hatchery spring chinook salmon returned and provided a small commercial tribal fishery—no commercial season for spring chinook salmon had taken place since 1977. Present Columbia River harvest rates are very low compared with those from the late 1930s through the 1960s (NOAA Fisheries 1991). Though steelhead—MCR steelhead included—were never as important a component of the Columbia basin's fisheries as chinook, net-based fisheries generally do not discriminate among species, so it can fairly be said that harvest has also contributed to the MCR steelhead declines. For more information on the adverse effects associated with harvest, please see NOAA Fisheries (2002a).

Natural Conditions

Natural changes in the freshwater and marine environments play a major role in salmonid abundance. Recent evidence suggests that marine survival among salmonids fluctuates in response to 20- to 30-year cycles of climatic conditions and ocean productivity (Hare et al. 1999). This phenomenon has been referred to as the Pacific Decadal Oscillation. In addition, large-scale climatic regime shifts, such as El Niño, appear to change ocean productivity. During the first part of the 1990s, much of the Pacific Coast was subject to a series of very dry years.

More recently, severe flooding has adversely affected some stocks (e.g., the low returns of Lewis River bright fall chinook salmon in 1999).

A key factor affecting many West Coast stocks—including MCR steelhead—has been a general 30-year decline in ocean productivity. The mechanism whereby stocks are affected is not well understood, partially because the pattern of response to these changing ocean conditions has differed among stocks, presumably due to differences in their ocean timing and distribution. It is presumed that survival is driven largely by events occurring between ocean entry and recruitment to a subadult life stage. For more information on the effects generated by natural processes and conditions, please see NOAA Fisheries (2002a).

Scientific Research

MCR steelhead, like other listed fish, are the subject of scientific research and monitoring activities. Most biological opinions NOAA Fisheries issues recommend specific monitoring, evaluation, and research efforts intended to help gather information that would be used to increase the survival of listed fish. In addition, NOAA Fisheries has issued numerous research permits authorizing takes of ESA-listed fish over the last few years. Currently, there are approximately 68 research actions taking place that affect MCR steelhead. Some of them (32) were authorized under section 4(d) of the ESA (NOAA Fisheries 2002b), the rest were authorized under section 7 in processes like the one being used to examine the currently proposed action (NOAA Fisheries 2002a). No take authorization, by itself, has the potential to lead to the decline of the species. However the sum of the authorized takes indicate a high level of research effort in the action area and, as anadromous fish stocks have continued to decline, the proportion of fish handled for research/monitoring purposes has increased. The effect of these activities is difficult to assess because despite the fact that fish are harassed and even killed in the course of scientific research, these activities have a great potential to benefit ESA-listed salmon and steelhead. For example, aside from simply increasing what is known about the listed species and their biological requirements, research is essentially the only way to answer key questions associated with difficult resource issues that crop up in every management arena and involve every salmonid life history stage (particularly the resource issues discussed in the previous sections). Perhaps most importantly, the information gained during research and monitoring activities will help resource managers recover listed species. That is, no rational resource allocation or management decisions can be made without the knowledge to back them up. Further, there is no way to tell if the corrective measures described in the previous sections are working unless they are monitored and no way to design new and better ones if research is not done.

In any case, scientific research and monitoring efforts (unlike the other factors described in the previous sections) are not considered to be a factor contributing to the decline of MCR steelhead, and NOAA Fisheries believes that the information derived from the research activities is essential to their survival and recovery. Nonetheless, fish *are* harmed during research activities. And activities that are carried out in a careless or undirected fashion are not likely to benefit the species at all. Therefore, to minimize any harm arising from research activities on the species, NOAA Fisheries imposes conditions in its permits/authorizations so that researchers conduct their activities in such a way as to reduce adverse effects—particularly killing as few salmonids as possible. Also, researchers are encouraged to use non-listed fish species and hatchery fish instead of listed naturally-produced fish when possible. In addition, researchers are required to share fish samples, as well as the results of the scientific research, with other researchers and comanagers in the region as a way to avoid duplicative research efforts and to acquire as much information as possible from the ESA-listed fish sampled. NOAA Fisheries also works with other agencies to coordinate research and thereby prevent duplication of effort.

In general, for projects that require a section 10(a)(1)(A) permit, applicants provide NOAA Fisheries with high take estimates to compensate for potential in-season changes in research protocols, accidental catastrophic events, and the annual variability in listed fish numbers. Also, most research projects depend on annual funding and the availability of other resources. So, a specific research project for which take of ESA-listed species is authorized may be suspended in a year when funding or resources are not available. As a result, the *actual* take in a given year for most research projects, as stated in the projects' post-season annual reports, is usually less than the authorized level of take.

<u>Summary</u>

In conclusion, the picture of whether MCR steelhead biological requirements are being met is more clear-cut for habitat-related parameters than it is for population factors: given all the factors for decline—even taking into account the corrective measures being implemented—it is still clear that the MCR steelhead's biological requirements are currently not being met under the environmental baseline. Thus their status is such that there must be a significant improvement in the environmental conditions of their habitat (over those currently available under the environmental baseline). Any further degradation of the environmental conditions could have a large impact because the species is already at risk. In addition, there must be efforts to minimize impacts caused by dams, harvest, hatchery operations, habitat degradation, and unfavorable natural conditions.

EFFECTS OF THE ACTION

The purpose of this section is to identify what effects NOAA Fisheries' authorization of scientific research will have on threatened MCR steelhead. The method NOAA Fisheries uses for evaluating effects is discussed first, followed by discussions of the general effects scientific research activities are known to have and also the specific effects that may occur.

Evaluating the Effects of the Action

Over the course of the last decade and hundreds of ESA section 7 consultations, NOAA Fisheries developed the following four-step approach for applying the ESA Section 7(a)(2) standards when determining what effect a proposed action is likely to have on a given listed species. What follows here is a summary of that approach[2].

1. Define the biological requirements and current status of each listed species.

2. Evaluate the relevance of the environmental baseline to the species' current status.

3. Determine the effects of the proposed or continuing action on listed species and their habitat.

4. Determine whether the species can be expected to survive with an adequate potential for recovery under (a) the effects of the proposed (or continuing) action, (b) the effects of the environmental baseline, and (c) any cumulative effects—including all measures being taken to improve salmonid survival and recovery.

The fourth step above requires a two-part analysis. The first part focuses on the action area and defines the proposed action's effects in terms of the species' biological requirements in that area (i.e., impacts on essential habitat features). The second part focuses on the species itself. It describes the action's impact on individual fish—or populations, or both—and places that impact in the context of the ESU as a whole. Ultimately, the analysis seeks to answer the questions of whether the proposed action is likely to jeopardize a listed species' continued existence or destroy or adversely modify its critical habitat.

Effects on Habitat

Previous sections have detailed the scope of the MCR steelhead habitat in the action area, described the essential features of that habitat, and depicted its present condition. The discussion here focuses on how those features are likely to be affected by the proposed actions.

Full descriptions of the proposed activities are found in the next section. In general, the activities will be (a) capturing fish with fyke and hoop nets, (b) sediment electrofishing for lamprey larvae, (c) water sampling at the mouth of the Umatilla River, and (d) redd surveys in lamprey spawning and rearing habitat. Fyke nets and hoop nets are deployed in such a way as to

---

[2] For more detail please see pages 4-10 of *The Habitat Approach: Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Salmonids* (NOAA Fisheries 1999).

eliminate habitat effects—they are not tied to trees and are not dragged along the stream bottom, thus are not expected to affect habitat. Electrofishing would occur in silt/mud substrate preferred by larval lamprey, not preferred habitat for juvenile steelhead and the probes are kept on top of the sediment thus no habitat-related effects are expected. Water sampling will occur over a very short time period and only minor amounts of water would be removed from the Umatilla River, thus no habitat effects are expected from this activity. Redd surveys do require some amount of walking in streams, however wading would occur only when necessary and only in June and July—after adult steelhead have completed spawning. Further, wading would only be done in areas where steelhead eggs are not expected to be deposited (silt/mud substrate).

All of these activities are minimally intrusive in terms of their effect on habitat. None of them will measurably affect any of the 10 essential fish habitat features listed earlier (i.e., stream substrates, water quality, water quantity, food, streamside vegetation, etc.). Moreover, the proposed activities are all of short duration. Therefore, NOAA Fisheries concludes that the proposed activities are unlikely to have an adverse impact on MCR steelhead habitat.

Effects on MCR Steelhead

The primary effects the proposed activities will have on MCR steelhead will occur in the form of direct "take" (the ESA take definition is given in the section titled "The Research Action") a major portion of which is in the form of harassment. Harassment generally leads to stress and other sub-lethal effects and is caused by observing, capturing, and handling fish. The ESA does not define harassment nor has NOAA Fisheries defined this term through regulation. However, the USFWS defines harassment as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to breeding, feeding or sheltering" [50 CFR 17.3]. For the purposes of this analysis, NOAA Fisheries adopts this definition of harassment.

The various proposed activities would cause many types of take, and while there is some blurring of the lines between what constitutes an activity (e.g., electrofishing) and what constitutes a take category (e.g., harm), it is important to keep the two concepts separate. The reason for this is that the effects being measured here are those which the activity itself has on the listed species. They may be expressed in *terms* of the take categories (e.g., how many MCR steelhead are harmed, or harassed, or even killed), but the actual mechanisms of the effects themselves (i.e., the activities) are the causes of whatever take arises and, as such, they bear examination. Therefore, the first part of this section is devoted to a discussion of the general effects known to be caused by the proposed activities—regardless of where they occur or what species are involved.

The following subsections describe the types of activities being proposed. Because they would all be carried out by trained professionals using established protocols and have widely recognized specific impacts, each activity is described in terms broad enough to apply to the proposed action. This is especially true in light of the fact that the researchers would not receive authorization unless their activities (e.g., electrofishing) incorporate NOAA Fisheries' uniform, pre-established set of mitigation measures. These measures are described under "Common Elements among the Proposed Actions" section of this Opinion. They are incorporated into every permit/authorization as part of the terms and conditions to which a researcher must adhere.

Observation

For some activities, ESA-listed fish will be observed in-water (i.e., redd surveys). Direct observation is the least disruptive method for determining presence/absence of the species and estimating their relative abundance. Its effects are also generally the shortest-lived among any of the research activities discussed in this section. Typically, a cautious observer can effectively obtain data without disrupting the normal behavior of a fish. Fry and juveniles frightened by the turbulence and sound created by observers are likely to seek temporary refuge in deeper water or behind or under rocks or vegetation. In extreme cases, some individuals may temporarily leave a particular pool or habitat type when observers are in their area. Researchers minimize the amount of disturbance by moving through streams slowly—thus allowing ample time for fish to reach escape cover; though it should be noted that the research may at times involve observing adult fish—which are more sensitive to disturbance. During some of the research activities discussed below, redds may be visually inspected, but no redds will be walked on. Harassment is the primary form of take associated with these observation activities, and few if any injuries or deaths are expected to occur—particularly in cases where the observation is to be conducted solely by researchers on the stream banks rather than in the water. There is little a researcher can do to mitigate the effects associated with observation activities because those effects are so minimal. In general, all they can do is move with care and attempt to avoid disturbing sediments, gravels, and, to the extent possible, the fish themselves.

Capture/handling

Capturing and handling fish causes them stress—though they typically recover fairly rapidly from the process and therefore the overall effects of the procedure are generally short-lived. The primary contributing factors to stress and death from handling are excessive doses of anesthetic, differences in water temperatures (between the river and wherever the fish are held), dissolved oxygen conditions, the amount of time that fish are held out of the water, and physical trauma. Stress on salmonids increases rapidly from handling if the water temperature exceeds 18°C or dissolved oxygen is below saturation. Fish that are transferred to holding tanks can experience trauma if care is not taken in the transfer process, and fish can experience stress and injury from overcrowding in nets and at traps if too many fish are captured and they are not released promptly. Debris buildup at traps can also kill or injure fish if the traps are not monitored and cleared on a regular basis.

Based on prior experience with the research techniques and protocols that would be used to conduct the proposed scientific research, no more than five percent of juvenile salmonids encountered are likely to be killed as an indirect result of being captured and handled and, in most cases, that figure will not exceed three percent. In addition, it is not expected that more than one percent of adults encountered will be killed. In any case, all researchers will employ the mitigation measures described earlier (Common Elements among the Proposed Actions) and thereby keep adverse effects to a minimum. Finally, any fish indirectly killed by the research activities may be retained as reference specimens or used for analytical research purposes.

Electrofishing

Electrofishing is a process by which an electrical current is passed through water containing fish in order to stun them—thus making them easier to capture. It can cause a suite of effects ranging from simple harassment to actually killing the fish (adults and juveniles) in an area where it is occurring. The amount of unintentional mortality attributable to electrofishing may vary widely depending on the equipment used, the settings on the equipment, and the expertise of the technician. Electrofishing can have severe effects on adult salmonids. Spinal injuries in adult salmonids from forced muscle contraction have been documented. Sharber and Carothers (1988) reported that electrofishing killed 50 percent of the adult rainbow trout in their study. The long-term effects electrofishing has on both juvenile and adult salmonids are not well understood, but long experience with electrofishing indicates that most impacts occur at the time of sampling and are of relatively short duration.

The effects electrofishing will have on MCR steelhead would be limited to the direct and indirect effects of exposure to an electric field, although the potential of being exposed to the electric field in this research action is limited by the special techniques used to collect larval lamprey. See the previous subsection for more detail on capturing and handling effects.

Most of the studies on the effects of electrofishing on fish have been conducted on adult fish greater than 300 mm in length (Dalbey et al. 1996). The relatively few studies that have been conducted on juvenile salmonids indicate that spinal injury rates are substantially lower than they are for large fish. Smaller fish intercept a smaller head-to-tail potential than larger fish (Sharber and Carothers 1988) and may therefore be subject to lower injury rates (e.g., Hollender and Carline 1994, Dalbey et al. 1996, Thompson et al. 1997). McMichael et al. (1998) found a 5.1 percent injury rate for juvenile MCR steelhead captured by electrofishing in the Yakima River subbasin. The incidence and severity of electrofishing damage is partly related to the type of equipment used and the waveform produced (Sharber and Carothers 1988, McMichael 1993, Dalbey et al. 1996, Dwyer and White 1997). Continuous direct current (DC) or low-frequency ($\leq$30 Hz) pulsed DC have been recommended for electrofishing (Fredenberg 1992, Snyder 1992, Dalbey et al. 1996) because lower spinal injury rates, particularly in salmonids, occur with these waveforms (Fredenberg 1992, McMichael 1993, Sharber et al. 1994, Dalbey et al. 1996). Electrofishing for larval lamprey would occur in silt/mud substrate, not a preferred habitat for juvenile steelhead, and during the time of year when adult steelhead are not expected to be present. Low voltage (125 volts) will be used which typically does not stun salmonids.

Only a few recent studies have examined the long-term effects of electrofishing on salmonid survival and growth (Ainslie et al. 1998, Dalbey et al. 1996). These studies indicate that although some of the fish suffer spinal injury, few die as a result. However, severely injured fish grow at slower rates and sometimes they show no growth at all (Dalbey et al. 1996). NOAA Fisheries' electrofishing guidelines (NOAA Fisheries 2000c) will be followed in the actions requiring this procedure. The guidelines require that field crews be trained in observing animals for signs of stress and shown how to adjust electrofishing equipment to minimize that stress. Electrofishing is used only when other survey methods are not feasible. All areas for stream and special needs surveys are visually searched for fish before electrofishing may begin. Electrofishing is not done in the vicinity of redds or spawning adults. All electrofishing equipment operators are trained by qualified personnel to be familiar with equipment handling, settings, maintenance, and safety. Operators work in pairs to increase both the number of fish that may be seen and the ability to identify individual fish without having to net them. Working in pairs also allows the researcher to net fish before they are subjected to higher electrical fields. Only DC units will be used, and the equipment will be regularly maintained to ensure proper operating condition. Voltage, pulse width, and rate will be kept at minimal levels and water conductivity will be tested at the start of every electrofishing session so those minimal levels can be determined. Due to the low settings used, shocked fish normally revive instantaneously. Fish requiring revivification will receive immediate, adequate care.

Research-Specific Effects

Under the Research Action, biologists from the CTUIR propose to hold captured lamprey at Three Mile Dam and introduce them into the Umatilla River. Indirect effects may include competition, predation, and disease transfer. Competition for resources is not expected as lamprey, and steelhead for that matter, are not at carrying capacity and usually do not spawn and rear in the same locations and at the same times. Although lamprey typically feed on adult fish in the marine environment, they are relatively ineffective at foraging in fresh water. Disease transfer from outplanted lamprey is not expected because all lamprey will be treated and checked for disease prior to release.

Adult and juvenile MCR steelhead may be harassed during several of the research actions. There exists the potential for steelhead redds to be disturbed and eggs destroyed during redd sampling. However, juvenile steelhead generally emerge before lamprey redd sampling is scheduled to begin. In addition, wading would occur only when necessary. Because surveys would occur during relatively low water periods, surveyors should be able to see and avoid redds. Electrofishing for larval lamprey is proposed in areas that may be occupied by steelhead. Electrofishing would occur after adult spawning, and thus adult steelhead are not expected to be affected. Juvenile steelhead may be in the proposed sampling area but it is not preferred habitat (slit/mud substrate). Moreover, the index plots would be small and the activity of short duration, so any steelhead in the area would have time to leave before electrofishing began. In addition, low voltage (125 volts) is used to collect larval lamprey, a level that does not typically stun steelhead. Water sampling may affect steelhead by displacing them from cool water refugia in the lower river, although neither adult nor juvenile steelhead are expected to use the lower portion of the Umatilla River during July.

Under the Research Action, biologists from the CTUIR could capture up to 30 adult and 2,000 juvenile MCR steelhead over the 5-year duration of the project. No more than one adult and 20 juvenile MCR steelhead may be killed in that time. The researchers would use a fyke nets and hoop nets to capture the lamprey and, because MCR steelhead are not the target of the research, any that are caught would be released immediately. However, the nature of netting operations is such that a small percentage of the steelhead netted may be killed.

Because the research that may affect adult steelhead would take place in the Umatilla and John Day Rivers, the contexts for determining its effect are the estimated adult average escapement of 1,200 MCR steelhead to Threemile Dam and 5,000 MCR steelhead to the John Day River (NOAA Fisheries 2002c). The death of one adult steelhead would thus constitute approximately 0.08 percent of the average annual Umatilla River population or 0.02 percent of the average annual John Day River population. These figures may be smaller because the recent trend in adult returns is increasing. But even if the actual percentages are not lower, there would still be a minimal effect on the Umatilla River and John Day River populations and a negligible effect on the ESU as a whole. In addition, the effect would only occur once in the five years the research is proposed and only in one of the rivers.

Because the research that may affect juvenile steelhead would take place in the John Day River, the context for determining its effect is the estimated juvenile steelhead production in the John Day Basin. Unfortunately such an estimate is not available. However, it is possible evaluate the loss of 20 juveniles to this research to the conservative juvenile outmigration estimate for the entire MCR steelhead ESU of more than 379,000 fish (Schiewe 2002). In this comparision, approximately 0.005 percent of the ESU would be killed by these actions. Both figures may be smaller because not all 20 fish should be killed in one year and recent trends in adult returns are increasing. But regardless of whether the actual percentage is lower, it would still have a minimal effect on the John Day River population and a negligible effect on the ESU as a whole.

Though the research would generate only an extremely small negative effect, the researchers would work to reduce it even further. They will avoid areas where steelhead are known to congregate and will monitor the nets constantly while in the water. It is expected the researchers will be able to quickly haul a net in when it has caught a fish. All captured fish will be released in an area away from the netting and so they would not be recaptured.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions not involving Federal activities that are reasonably certain to occur within the action area subject to this consultation. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

State, tribal and local government actions will likely to be in the form of legislation, administrative rules or policy initiatives. Government and private actions may encompass changes in land and water uses—including ownership and intensity—any of which could impact listed species or their habitat. Government actions are subject to political, legislative, and fiscal uncertainties. These realities, added to the geographic scope of the action area which encompasses numerous government entities exercising various authorities and the many private landholdings, make any analysis of cumulative effects difficult and speculative. For more information on the various efforts being made at the local, tribal, state, and national levels to conserve MCR steelhead and other listed species, please see NOAA Fisheries (2002a).

Non-Federal actions are likely to continue affecting listed species. The cumulative effects in the action area are difficult to analyze considering the large geographic scope of this opinion, the different resource authorities in the action area, the uncertainties associated with government and private actions, and the changing economies of the region. Whether these effects will increase or decrease is a matter of speculation; however, based on the trends identified in this section, the adverse cumulative effects are likely to increase. Although state, tribal and local governments have developed plans and initiatives to benefit listed fish, they must be applied and sustained in a comprehensive way before NOAA Fisheries can consider them “reasonably foreseeable” in its analysis of cumulative effects.

Integration and Synthesis of Effect

All of the MCR fish that will be captured, handled, observed, etc., during the course of the proposed research are expected to survive with no long-term effects. Moreover, most capture and handling methods will be minimally intrusive and of short duration. Based on prior experience with the research techniques and protocols that would be used to conduct the proposed scientific research, no salmonids are likely to be killed as an indirect result of being captured and handled. But because the potential to harm fish does exist, and to be conservative in the analysis of the impacts of these actions, one adult fish mortality is included in this analysis. Because so many of the captured fish are expected to survive the research actions and so few of the total MCR steelhead outmigration will be affected in even the slightest way, it is

likely that no adverse effects will result from these actions at either the population or the ESU level. Therefore, adverse effect must be expressed in terms of the individual fish that may be killed during the various authorized activities. Table 3 summarizes these effects for the research action.
In all cases, MCR steelhead are not targeted by this work and will be avoided whenever possible. If collected, MCR steelhead will be immediately released near the location they were captured or held temporarily in an aerated live well to aid recovery.

Table 3: Maximum Take of Threatened MCR Steelhead for 2002-2006.

	Adult				Juvenile			
	HANDLE		MORTALITY		HANDLE		MORTALITY	
Action	C,H,R	C,T/M,R	DIRECT	INDIRECT	C,H,R	C,T/M,R	DIRECT	INDIRECT
1. Estimate lamprey abundance	30			1	2,000			20
2. Increase lamprey abundance	0			0				
3. Determine lamprey reproductive success	0			0				
4. Assess lamprey artificial propagation	0			0				
5. Measure lamprey response to EOG	0			0				
TOTALS	30	0	0	1	2,000	0	0	20

Key: C,H,R = Capture, Handle, Release; C,T/M,R = Capture, Tag/Mark, Release

It is impossible to determine the negative effect that killing one adult MCR steelhead in the Umatilla or John Day Rivers would have on the ESU as a whole. Likewise, it is impossible to determine the negative effect that killing 20 juvenile MCR steelhead in the John Day River would have on the ESU as a whole. Nonetheless, regardless of its magnitude, the negative effect associated with the proposed actions must be juxtaposed with the benefits to be derived from the research. Those benefits include restoring naturally reproducing populations of Pacific lamprey, a species important to the CTUIR and, moreover, the MCR ecosystem. Therefore, in deciding whether to approve the actions considered here, NOAA Fisheries must compare the tangible benefits they will produce (some of which are potentially significant) with the negligible adverse effects they will cause. Moreover, NOAA Fisheries must weigh similar factors (benefit versus adverse effect) when deciding whether the contemplated actions will appreciably reduce the likelihood of the MCR steelhead's survival and recovery—the critical determination in issuing any biological opinion.

Conclusions

After reviewing the current status of the threatened MCR steelhead, the environmental baseline for the action area, the effects of the proposed research action and cumulative effects, it is

NOAA Fisheries' biological opinion that the research is not likely to jeopardize the continued existence of threatened MCR steelhead.

Coordination with the National Ocean Service

None of the activities contemplated in this Biological Opinion will be conducted in or near a National Marine Sanctuary. Therefore, these activities will not have an adverse effect on any National Marine Sanctuary.

INCIDENTAL TAKE STATEMENT

Section 9 and the regulations implementing section 4(d) of the ESA prohibit any take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of ESA-listed species without a specific permit or exemption. When a proposed Federal action is found to be consistent with Section 7(a)(2) of the ESA (i.e., the action is found not likely to jeopardize the continued existence of an ESA-listed species or result in the destruction or adverse modification of critical habitat) and that action may incidentally take individuals of an ESA-listed species, NOAA Fisheries will issue an Incidental Take Statement (ITS) specifying the impact of any incidental take of the endangered or threatened species.

The ITS provides reasonable and prudent measures that are necessary to minimize impacts, and sets forth terms and conditions with which an action agency or permit applicant must comply in order to implement the reasonable and prudent measures. "Incidental" take is that which occurs while an agency or an applicant is engaged in an otherwise lawful activity; it is exempted from the take prohibition by section 7(o) of the ESA, but only if that take is in compliance with the specified terms and conditions. The measures described below are non-discretionary and must be undertaken by NOAA Fisheries for the exemption in section 7(o)(2) to apply. If NOAA Fisheries (1) fails to cause the terms and conditions to be implemented or (2) fails to require the action agency or applicant to adhere to the enforceable terms and conditions of this ITS, the protective coverage of Section 7(o)(2) may lapse. In order to monitor the impact of incidental takes, the action agency or applicant must report the progress of its actions and their impacts on the species to NOAA Fisheries as specified in this ITS [50 CFR 402.14(I)(3)].

Amount or Extent of Incidental Take

The maximum incidental take of threatened MCR steelhead over the 5-year project duration can be specified for the research action proposed by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR). The CTUIR may incidentally take a maximum of 30 adult and 2,000 juvenile MCR steelhead. One adult and 20 juvenile MCR steelhead may be killed as a result of the incidental take over the 5-year project duration. In the accompanying biological opinion, NOAA Fisheries determined that this level of take is not likely to jeopardize MCR steelhead.

If this specified maximum incidental take level is reached or exceeded, NOAA Fisheries may cause the scientific research activities to cease until this consultation is reinitiated or a new consultation is completed.

Reasonable and Prudent Measures

NOAA Fisheries believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of taking ESA-listed species. The action agency is directed to (a) use all possible care to minimize the effects of the operations, (b) use experienced staff for all fish sampling operations, (c) cooperate with other researchers during this sampling and to report the results of the sampling to NOAA Fisheries and all other interested parties, and (d) demonstrate that the project is fulfilling its purpose of generating important data on Pacific lamprey.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the CTUIR must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring actions. These terms and conditions are non-discretionary.

1. ESA-listed fish must be handled with extreme care and kept in water to the maximum extent possible during sampling and processing procedures. Adequate circulation and replenishment of water in holding units is required. When using gear that capture a mix of species, ESA-listed fish must be released as soon as possible after being captured to minimize the duration of handling stress.

2. Researchers must not intentionally kill or cause to be killed any ESA-listed species that may be incidentally taken.

3. Due caution must be exercised during netting operations to avoid disturbing, disrupting, or harassing ESA-listed steelhead. Whenever possible, walking in the stream must be avoided, especially in areas where ESA-listed steelhead are likely to spawn.

4. The fyke net to be used must be constantly monitored while it is in the water.

5. Researchers must report whenever the authorized level of incidental take is exceeded, or if circumstances indicate that such an event is imminent. Notification should be made as soon as possible, but no later than two days after the authorized level of take is exceeded. Researchers must then submit a detailed written report. Pending review of these circumstances, NOAA Fisheries may suspend research activities and/or reinitiate consultation to allow research activities to continue.

6. Researchers must submit a post-season report to NOAA Fisheries summarizing the results of the research and the success of the research relative to its goals. The report must include a detailed description of activities, the total number of fish taken at each location, an estimate of the number of ESA-listed fish taken at each location, the manner of take, and the dates/locations of take.

Conservation Recommendations

Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on ESA-listed species or critical habitat, to develop additional information, or to assist Federal agencies in complying with their obligations under section 7(a)(1) of the ESA. NOAA Fisheries believes the following conservation recommendation is consistent with these obligations and therefore should be implemented:

> NOAA Fisheries shall monitor actual annual takes of ESA-listed fish species—as provided to NOAA Fisheries in annual reports or by other means—and shall adjust permitted take levels if they are deemed to be excessive or if cumulative take levels are determined to operate to the disadvantage of the ESA-listed species.

Reinitiation of Consultation

Consultation must be reinitiated if: The amount or extent of the specified take is exceeded or is expected to be exceeded; new information reveals effects of the actions that may affect the ESA-listed species in a way not previously considered; a specific action is modified in a way that causes an effect on the ESA-listed species that was not previously considered; or a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

MAGNUSON-STEVENS ACT ESSENTIAL FISH HABITAT CONSULTATION

"Essential fish habitat" (EFH) is defined in section 3 of the Magnuson-Stevens Act (MSA) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." NOAA Fisheries interprets EFH to include aquatic areas and their associated physical, chemical and biological properties used by fish that are necessary to support a sustainable fishery and the contribution of the managed species to a healthy ecosystem.

The MSA and its implementing regulations at 50 CFR 600.920 require a Federal agency to consult with NOAA Fisheries before it authorizes, funds or carries out any action that may adversely effect EFH. The purpose of consultation is to develop a conservation recommendation(s) that addresses all reasonably foreseeable adverse effects to EFH. Further, the action agency must provide a detailed, written response NOAA Fisheries within 30 days after receiving an EFH conservation recommendation. The response must include measures proposed by the agency to avoid, minimize, mitigate, or offset the impact of the activity on EFH. If the response is inconsistent with NOAA Fisheries' conservation recommendation the agency must explain its reasons for not following the recommendations.

The objective of this consultation is to determine whether the proposed actions are likely to adversely affect EFH. If the proposed actions are likely to adversely affect EFH, a conservation recommendation(s) will be provided.

Identification of Essential Fish Habitat

The Pacific Fishery Management Council (PFMC) is one of eight Regional Fishery Management Councils established under the Magnuson-Stevens Act. The PFMC develops and carries out fisheries management plans for Pacific coast groundfish, coastal pelagic species, and salmon off the coasts of Washington, Oregon, and California. Pursuant to the MSA, the PFMC has designated freshwater EFH for Pacific salmon; it includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (i.e. natural waterfalls in existence for several hundred years)(PFMC 1999). Marine EFH for Pacific salmon in Oregon and Washington includes all estuarine, nearshore and marine waters within the western boundary of the U.S. Exclusive Economic Zone (EEZ), 200 miles offshore.

Proposed Action and Action Area

For this EFH consultation the proposed actions and action area are as described in detail in the ESA consultation above. The action is the authorization of the proposed research action in the Umatilla and John Day Rivers, Oregon. The proposed action area is the middle Columbia River basin. A more detailed description and identification of EFH for salmon is found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). The impacts of the proposed actions on these species' EFH are assessed based on this information.

Effects of the Proposed Action

Based on information submitted by the action agency, as well as NOAA Fisheries' analysis in the ESA consultation above, NOAA Fisheries believes that the effects of this action on EFH are likely to be within the range of effects considered in the ESA portion of this consultation.

Conclusion

Using the best scientific information available and based on its ESA consultation above, as well as the foregoing EFH consultation sections, NOAA Fisheries has determined that the proposed actions are not likely to adversely affect Pacific salmon EFH.

EFH Conservation Recommendation

NOAA Fisheries has no conservation recommendations to make in this instance.

Consultation Renewal

The action agencies must reinitiate EFH consultation if plans for these actions are substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for the EFH conservation recommendations (50 CFR Section 600.920(k)).

REFERENCES

Ainslie, B. J., J. R. Post, and A. J. Paul. 1998. Effects of Pulsed and Continuous DC Electrofishing on Juvenile Rainbow Trout. North American Journal of Fisheries Management: Vol. 18, No. 4, pp. 905–918.

Barnhart, R. A. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest)–steelhead. U.S. Fish and Wildlife Service, Biological Report 82(11.60).

Brown, L. 1999. Memo re: final Priest Rapids steelhead update (week of 10–16 October 1999), to B. Leland. Washington Department of Fish and Wildlife, Wenatchee, Washington. October 19, 1999.

Burgner, R. L., J. T. Light, L. Margolis, T. Okazaki, A. Tautz, and S. Ito. 1992. Distribution and origins of steelhead trout (*Oncorhynchus mykiss*) in offshore waters of the North Pacific Ocean. International North Pacific Fish Commission Bulletin 51.

Busby, P. J., T. C. Wainwright, G. J. Bryant, L. J. Lierheimer, R. S. Waples, F. W. Waknitz, and I. V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon, and California. National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, Washington.

CBFWA (Columbia Basin Fish and Wildlife Authority). 1990. Snake River subbasin (mainstem from mouth to Hells Canyon Dam) salmon and steelhead production plan. CBFWA, Northwest Power Planning Council, Portland, Oregon.

CTUIR (Confederated Tribes of the Umatilla Indian Reservation). 2000. Draft Hatchery and Genetic Management Plan. CTUIR, Pendleton, Oregon.

Dalbey, S. R., T. E. McMahon, and W. Fredenberg. 1996. Effect of electrofishing pulse shape and electrofishing-induced spinal injury to long-term growth and survival of wild rainbow trout. North American Journal of Fisheries Management 16:560-569.

Dwyer, W. P. and R. G. White. 1997. Effect of Electroshock on Juveline Arctic Grayling And Yellowstone Cutthroat Trout Growth 100 Days after Treatment. North American Journal of Fisheries Management 17:174-177.

Fish Passage Center. 2000. Adult salmon passage counts. FPC (Fish Passage Center) Home. <*http:www.fpc.org/adlthist/prdadult.htm*> (accessed October 10, 2000).

Flagg, T. A., F. W. Waknitz, D. J. Maynard, G. B. Milner, and C. V. W. Mahnken. 1995. The effect of hatcheries on native coho salmon populations in the lower Columbia River. *In* Uses and effects of cultured fishes in aquatic systems. Transactions of the American Fisheries Society 15:366-375.

Fredenberg, W.A. 1992. Evaluation of electrofishing-induced spinal injuries resulting from field electrofishing surveys in Montana. Montana Department of Fish, Wildlife and Parks, Helena, MT.

Hare, S. R., N. J. Mantua, and R. C. Francis. 1999. Inverse Production Regimes: Alaska and West Coast Pacific Salmon. Fisheries 24(1):6–14.

Hollender, B. A. and R. F. Carline. 1994. Injury to wild brook trout by backpack electrofishing. North American Journal of Fisheries Management 14:643-649.

McMichael, G.A. 1993. Examination of electrofishing injury and short-term mortality in hatchery rainbow trout. North American Journal of Fisheries Management 13:229-233.

McMichael, G. A., L. Fritts, and T. N. Pearsons. 1998. Electrofishing Injury to Stream Salmonids; Injury Assessment at the Sample, Reach, and Stream Scales. North American Journal of Fisheries Management 18:894-904.

Meehan, W. R. and T. C. Bjornn. 1991. Salmonid distributions and life histories. Pages 47-82 *in* W. R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Pub. 19, Bethesda, MD.

Nickelson, T. E., J. W. Nicholas, A. M. McGie, R. B. Lindsay, D. L. Bottom, R. J. Kaiser, and S. E. Jacobs. 1992. Status of anadromous salmonids in Oregon coastal basins. Oregon Department of Fish and Wildlife, Research and Development Section, Corvallis, and Ocean Salmon Management, Newport, Oregon.

NOAA Fisheries. 1991. Factors for decline: A supplement to the notice of determination for Snake River spring/summer chinook salmon under the Endangered Species Act. NOAA Fisheries, Protected Resources Division, Portland, Oregon.

NOAA Fisheries. 1997. Status Review Update for West Coast Steelhead from Washington, Idaho, Oregon, and California. Prepared by the West Coast Steelhead Biological Review Team. July 7, 1997.

NOAA Fisheries. 1999. The Habitat Approach: Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids. Prepared by the National Marine Fisheries Service, Northwest Region, Habitat Conservation and Protected Resources Divisions, August 26, 1999.

NOAA Fisheries. 2000a. Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin. NOAA Fisheries Northwest Region. Date Issued: December 21, 2000.

NOAA Fisheries. 2000b. White Paper: Salmon and steelhead hatcheries—the problems. NOAA Fisheries, Sustainable Fisheries Division, Portland, Oregon. February 3, 2000.

NOAA Fisheries. 2000c. Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act. Protected Resources Division, NOAA Fisheries, Portland, Oregon. June 2000.

NOAA Fisheries. 2002a. National Marine Fisheries Service ESA Section 7 Consultation Biological Opinion and Magnuson–Stevens Act Essential Fish Habitat Consultation on 16 research actions affecting middle Columbia River steelhead. NOAA Fisheries Protected Resources Division, Portland, Oregon. February, 2002. Consultation Number F/NWR/2001/01191.

NOAA Fisheries. 2002b. Determination Memorandum recommending approval of research programs submitted by ODFW, WDFW, and IDFG under the July 2000 4(d) rule's research limit. Signed by Donna Darm, NWR Assistant Regional Administrator, on April 26, 2002.

NOAA Fisheries. 2002c. Draft National Marine Fisheries Service ESA Section 7 Consultation Biological Opinion and Magnuson–Stevens Act Essential Fish Habitat Consultation on the collection, rearing, and release of salmonids associated with artificial propagation programs in the middle Columbia River steelhead Evolutionarily Significant Unit (ESU). NOAA Fisheries Sustainable Fisheries Division, Portland, Oregon. Expected final publication in October of 2002.

NOAA. 2000. Final Rule, Endangered and Threatened Species: Critical Habitat for 19 Evolutionarily Significant Units of Salmon and Steelhead in Washington, Oregon, Idaho, and California. February 16, 2000. Federal Register 65(32): 7764-7787.

ODFW (Oregon Department of Fish and Wildlife) and WDFW (Washington Department of Fish and Wildlife). 1998. Status report, Columbia River fish runs and fisheries, 1938-1997. ODFW, Portland, Oregon, and WDFW, Olympia, Washington.

ODFW. 2002. Mid-Columbia District of the ODFW. Unpublished data. The data will be incorporated as part of the District's January, 2003, Annual Report.

Pacific Fishery Management Council (PFMC). 1999. Amendment 14 to the Pacific Coast

Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Pacific Fishery Management Council, Portland, Oregon.

Ricker, W. E. 1959. Evidence for environmental and genetic influence on certain characters which distinguish stocks of the Pacific salmons and steelhead trout. Fisheries Research Board of Canada, Biological Station, Nanaimo, B.C.

Schiewe, M. 2002. Estimation of Percentages for Listed Pacific Salmon and Steelhead Smolts Arriving at Various Locations in the Columbia River Basin in 2002. Memorandum to D. Darm. March 28, 2002.

Sharber, N. G. and S. W. Carothers. 1988. Influence of electrofishing pulse shape on spinal injuries in adult rainbow trout. North American Journal of Fisheries Management 8:117-122.

Sharber, N. G., S. W. Carothers, J. P. Sharber, J. C. DeVos, Jr. and D. A. House. 1994. Reducing electrofishing-induced injury of rainbow trout. North American Journal of Fisheries Management 14:340-346.

Snyder, D. L. 1992. Impacts of Electrofishing on fish. Contribution number 50 of the Larval Fish Laboratory, Colorado State University, Fort Collins.

Thompson, K. G., E. P. Bergersen, R. B. Nehring and D. C. Bowden. 1997. Long-term effects of electrofishing on growth and body condition of brown and rainbow trout. North American Journal of Fisheries Management 17:154-159.

Waples, R. S. 1991. Defenition of “Species” Under the Endangered Species Act: Application to Pacific Salmon. U.S. Department of Commerce, NOAA Technical Memorandum, NOAA Fisheries, F/NWC-194. 29 pp.

WDF (Washington Department of Fisheries), Washington Department of Wildlife, and Western Washington Treaty Indian Tribes. 1993. Washington state salmon and steelhead stock inventory (SASSI), 1992. Available from WDF, Olympia, WA.